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EXPERIMENTAL STATION
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TECHNICAL MINUTE NO. 88

OBSERVATIONS ON SOME OF THE DRAWBACKS IN THE USE OF ANTI/GAS OINTMENTS WHEN APPLIED TO THE EXPOSED SKIN FOR PROPHLACTIC PURPOSES AGAINST MUSTARD VAPOUR

SUMMARY

1. Observations made during the course of field trials carried out in the jungle at San Jose and at Suffield have brought to light a number of disadvantages and limitations attending the use of M5 ointment applied to the exposed skin as a prophylactic against mustard vapour.

2. The main drawbacks are:

(a) The ease with which the respirator eyepiece is stained by ointment and vision impaired.

(b) The difficulty of handling and aiming small arms such as rifles and revolvers.

(c) The need for an additional article of equipment in the form of an impregnated skull-cap to protect the scalp on which it is not practicable to apply ointment.

3. A number of additional disadvantages attending the prophylactic use of anti-gas ointment are mentioned in this memorandum.

4. Although many of the trials referred to in this memorandum were carried out with M5 ointment, it is to be emphasized that all criticism applies more or less to any existing type of ointment.

Recommendations

5. It is recommended that the impregnated hood and impregnated gloves be adopted as the standard method of protection of the exposed skin against mustard vapour, and that anti-gas ointment be no longer used for that purpose except in emergencies as mentioned below.

6. It is further recommended that anti-gas ointment be retained as an item of personal issue for the following purposes:-

(a) As a decontaminant of liquid vesicant.
(b) To reinforce the protective properties of the impregnated gloves when there is a likelihood of slight liquid contaminati
(c) As an emergency prophylactic measure for application to the exposed skin if the impregnated hood or gloves be lost or to:

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EXPERIMENTAL STATION
SUFFIELD, ALBERTA

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OBSERVATIONS ON SOME OF THE DRAWBACKS IN THE USE OF ANTI/GAS OINTMENTS WHEN APPLIED TO THE EXPOSED SKIN FOR PROPHYLACTIC PURPOSES AGAINST MUSTARD VAPOUR.

INTRODUCTION

1. In the course of several field trials carried out under jungle conditions at San Jose in which M5 anti-gas ointment was applied to the exposed skin (neck, ears and hands), certain disadvantages attending the use of the ointment became apparent. These disadvantages were prominent and impressed themselves strongly on both those who directed the trials and those who took part in them.

2. M5 ointment has been adopted by the U.S. as the standard protective ointment for all climates and by the U.K. as the standard protective ointment for tropical climates.

3. In the literature, no reference can be found to the disadvantages attending the use of anti-gas ointment in field trials with the exception of a comment in a San Jose report (Field Trial PA5 3H) on some of the points which are dealt with in greater detail in the present memorandum. At Bushnell the experience with M5 ointment in field trials was similar to that at San Jose and was referred to in a Bushnell Weekly News Letter.

4. The purpose of the present memorandum is to draw attention to the experiences obtained with M5 ointment at San Jose, and with M5, A.G. No. 6 (British) and No. 5 (Canadian) anti-gas ointments at Suffield.

EXPERIENCE AT SAN JOSE

5. In a number of field trials carried out under jungle conditions at San Jose, M5 ointment was applied for prophylactic purposes to the neck and skin of the face not covered by the respirator facepiece, the ears, the hair line, the hands, wrists and distal portions of the forearms.

6. Need for Additional Protection for the Scalp.

At an early stage, the need for protection of the scalp became apparent since crusted lesions developed on this area after exposure even to moderate Ct's of mustard vapour. The necessity for scalp protection and the impracticability of using anti-gas ointment for inunction into the scalp were recognized simultaneously at other installations (e.g. Australia), as a result of which Edgewood was requested to develop an impregnated skull-cap which could be worn beneath the service helmet.

7. Staining of Respirator Eyepieces.

It was found necessary to instruct troops who had applied M5 ointment on to their hands to avoid touching the facepiece eyepieces, otherwise opaque spots and smears would soil the eyepieces and impair vision. In spite of this, masked troops taking part in prolonged and arduous exercises in the jungle frequently emerged with semi-opaque smears of ointment on their eyepieces partially obscuring their vision. Often it was possible to improve the situation by wiping the eyepieces with the sleev but sometimes this defeated its purpose because the cuff of the sleeve was frequently smeared with ointment when the hands and wrists were being inuncted. The more resourceful man usually found a way of cleaning his eyepieces by wiping them with his handkerchief or some part of his equipment Nevertheless, the ease and frequency with which vision could be impaired in the jungle in this way when the preservation of maximum vision was all important was a disturbing feature of the use of ointment on the hands and added to the ever-present discomfort and hazards of exercises in the jungle.

8. Interference with the Use of Small Arms.

At San Jose troops with ointment applied to the hands did not carry out firing trials with small arms. The difficulty of handling rifles, Browning Automatic Rifles (B.A.R.) and other weapons was evident, the ointment and freely-sweating skin giving an insecure grip on the smooth surfaces of the weapons.

9. Other Disadvantages of Anti-Gas (M5) Ointment.

Notebooks were invariably soiledwith indelible marks, making note-taking almost impossible. Map overlays were similarly stained.

EXPERIENCE AT SUFFIELD

10. A number of observations were made at Suffield under circumstances which attempted to reproduce the conditions obtaining in the field.

11. Effect of Touching Respirator Eyepieces.

The eyepieces of the U.S. service gas mask facepiece, the U.S. assault mask, the British G.S. facepiece and the British Light Type facepiece were touched with the fingers of a hand which had been inuncted with a number of anti-gas ointments. These included M5, A.G. No. 6 (British) and No. 5 (Canadian, labelled "Not for Tropical Use"). In each case a spot remained at the point of contact, more opaque with M5 than with the other two ointments. The spots were easily removed by wiping with a clean cloth. With large stains more effort had to be applied or the spot was altered to a diffuse smear. The sleeve of the shirt suffic as a cleaning surface but, after a few uses, the cuff became soiled with ointment and hindered rather than helped.

12. Effect of Handling and Firing Small Arms.

Tests have been conducted (by Major A.D. Odell of the Special Weapons Section) to determine the degree of soiling, difficulty in handling and aiming, and interference with the action of the rifle, revolver and light machine gun, (Bren) (LMG), which is occasioned by the inunction of ointment M5 on the hands (Suffield Local Trial No. 92).

13. Rifle No. 4, Mk.1.[x]

Thirty rounds were fired at the rapid rate, with an assumed stoppage at the completion of 10 rounds and again at the completion of 20 rounds. Under the conditions of the test (air temperature 30°F) it was noted that the action of the bolt of the rifle was interfered with to a considerable degree. Examination showed that this was due to contamination of the bolt which occurred during correction of simulated stoppages and to a rather heavy accumulation of ointment on the bolt channels which arose during loading operations. Since this test was performed on light snow cover, the added frictional effects of sand and dust could not be determined.

14. The chamber and barrel did not appear to be fouled to any great extent - recoil was normal and insertion and removal of cartridges was not interfered with.

15. The degree of external contamination is shown in the attached photographs (Figures 1 and 2). This smearing of the woodwork makes it almost impossible to hold a steady aim with the normal amount of grip by the left hand. There is a strong tendency for the left hand to "creep" back toward the breech so that it eventually comes to rest against the forward end of the magazine with the fingers dangerously close to the chamber entrance.

16. The rifle was aimed, but not fired, with the hands inunoted with A.G. No. 6 (British) and A.G. No. 5 (Canadian) ointments. The same difficulty in aiming mentioned above caused by the tendency of the left hand to "creep" backwards was noted.

17. Pistol, Cal. 38 S.and W.

Interference with grip is the only apparent drawback to the use of this weapon while the hands are covered with ointment. It is necessary to change the position of the hand after each shot due to a slip of the hand up the back side of the grip toward the hammer. Although the walls of the chambers were thinly coated with ointment after firing thirty rounds, excessive fouling does not appear to occur either in the barrel or the chamber.

18. The attached photograph (Figure 3) shows the degree of external contamination which is experienced. It is possible that, under very dusty conditions, interference with the action might arisebut no assessment was possible under the conditions obtaining at the time of the trial.

19. L.M.G. (Bren)

Five hundred rounds were loaded with ointment (M5) covered hands and then fired at a rapid rate with four simulated stoppages. One stoppage was a major one, it being supposed that the extractor stay spring had broken and was replaced. No interference with normal aiming and firing was noted, nor was there any increase in the normal amount of fouling.

DISCUSSION

20. The disadvantages of anti-gas ointments applied to the unprotected skin for prophylactic purposes against mustard vapour are summarized and listed below. Included are observations which have actually been made in the field or in the laboratory, as well as drawbacks which are likely to be encountered when ointments are used under field conditions.

(a) Interference with the use and control of small arms. In the case of the rifle and the revolver, the aim may be seriously impaired.

(b) Interference with clear vision through respirator eyepieces by accidentally touching the eyepieces, thereby leaving an opaque stain.

(c) Staining of papers, books, map overlays, etc.

(d) Does not do away with the need for an impregnated garment for protection of the scalp.

(e) Application of ointment as recommended to the neck and on the upper chest and shoulders, into the ears and the hair line and on the hands and wrists, extending upwards on the forearms, is cosmetically undesirable, the clothing being stained in the case of M5 ointment with a green-blue colour which is difficult to remove.

(f) Unless one's conception of the use of mustard vapour in the tropics is completely wrong, personnel will be exposed more or less frequently to transient atmospheres of vapour. Since anti-gas ointment, once applied, remains on the skin for many hours, troops will show a tendency to postpone going through the disagreeable procedure of applying ointment or they will delay it to the last moment in the hope that the need for protection will pass or not arise. In this way the individual may be exposed to an accumulation of sub-casualty dosages of vapour. The ideal protection of the exposed skin should be easily and quickly adjustable and removable.

(g) Frequent application in hot, humid conditions is necessary for full protection against moderately high dosages of vapour. In a field trial at Bushnell (M70 - 47 carried out 30 Aug 44) men who were exposed to Ct 5000 of mustard vapour over a period of 22 hours applied ointment (M5) every one-half hour for the first two hours and thereafter at intervals of from one to three hours. Assuming one tube was used at each application, the number of tubes of ointment required per man was 10 - 24. While this expenditure may be in excess of that necessary for adequate protection, the provision of ointment to individuals, within even this order of expenditure, would raise problems of supply especially in an active theatre of war.

(h) Eating and handling of food is difficult or impossible without wiping the ointment off the hands.

(i) Protection afforded against mustard vapour is considerably below that of other protective measures available, e.g. CC-2 impregnated gloves and hoods.

21. The advantage of an anti-gas ointment which could be used for the dual purpose of decontamination of liquid vesicant and prophylaxis against mustard vapour are obvious. The alternative form of protection available for the exposed skin against vapour is the use of the impregnated hood and gloves. The main objection to the general adoption of these garments is that they involve the issue of three extra articles of equipment to the soldier. In this respect, however, much of the advantage of ointment over the impregnated accessories is lost in view of the necessity of providing an impregnated garment for protection of the scalp in conjunction with the use of ointment on the exposed skin. The arguments are also advanced that (a) impregnated hoods add appreciably to the discomfort from heat in the tropics and tend to bring about heat exhaustion, and (b) that the bare hand is essential for the accurate handling and firing of weapons. The present U.S. impregnated hood leaves plenty of room for improvement. It is understood that a new type of hood has been designed from a lighter fabric and equipped with a drawstring for fastening around the facepiece. Providing that successful impregnation can be achieved, this garment should eliminate many of the disadvantages of the older hood.

22. The suggestion is proffered on the basis of experience in field trials and laboratory observations that, in spite of the considerable advances made in the development of an ideal anti-gas ointment, protection of the exposed skin and scalp against mustard vapour should be furnished by an impregnated hood and gloves. Furthermore, there should be no distinction in the protection laid down for these areas between troops in forward and rear positions. Anti-gas ointment should be carried for the purpose of decontamination of liquid vesicant and may be used to reinforce the protective properties of impregnated gloves when there is a danger of additional liquid contamination of slight degree[x] on the gloves and as an emergency prophylactic application, if the hood or gloves be lost or torn.

[x] It has been shown at San Jose that, while ointment applied to the hands beneath impregnated gloves gives added protection against liquid mustard, the combination should not be regarded as a substitute for impervious gloves when there is a likelihood of heavy liquid contamination.

SUMMARY AND CONCLUSIONS

23. Observations made during the course of field trials carried out in the jungle at San Jose and at Suffield have brought to light a number of disadvantages attending the use of M5 ointment applied to the exposed skin as a prophylactic against mustard vapour.

24. The main drawbacks are:

(a) The ease with which the respirator eyepiece is stained by ointment and vision impaired.

(b) The difficulty of handling and aiming small arms such a rifles and revolvers.

(c) The need for an additional article of equipment in the form of an impregnated skull-cap to protect the scalp on which it is not practicable to apply ointment.

25. A number of additional disadvantages attending the prophylactic use of anti-gas ointment are mentioned in this memorandum.

26. Although many of the trials referred to in this memorandum were

RECOMMENDATIONS

27. It is recommended that the impregnated hood and impregnated gloves be adopted as the standard method of protection of the exposed skin against mustard vapour, and that anti-gas ointment be no longer used for that purpose except in emergencies as mentioned below.

28. It is further recommended that anti-gas ointment be retained as an item of personal issue for the following purposes:-

(a) As a decontaminant of liquid vesicant.

(b) To reinforce the protective properties of the impregnated gloves when there is a likelihood of slight liquid contamination.

(c) As an emergency prophylactic measure for application to the exposed skin if the impregnated hood or gloves be lost or torn.

This memorandum was prepared by Lt.Col. W. Somerville, H/Physiology Section, Experimental Station, Suffield, Alberta.

E.Ll. Davies

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WS/EH

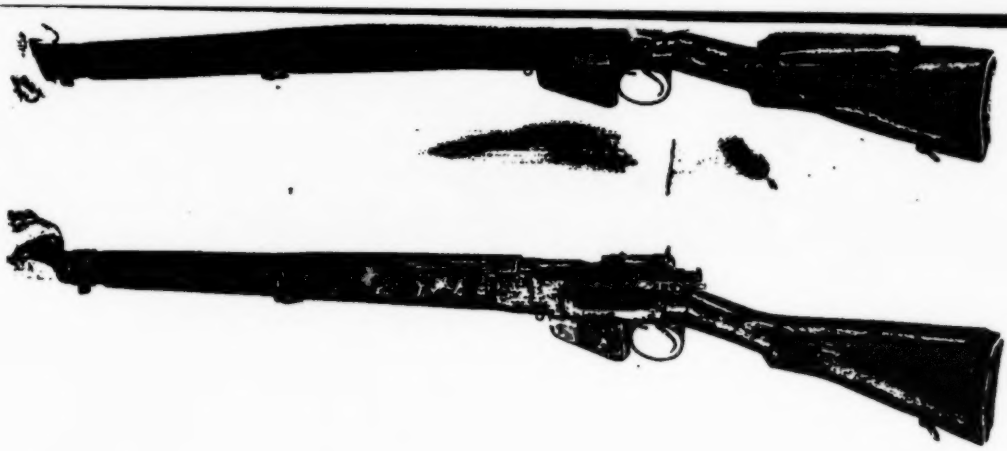

Fig. I. I-C-10-1043-7
Rifle below showing extent of smearing of the woodwork with ointment M5 after it has been used to fire 30 rounds. An unused rifle of similar colour is shown above for comparison. The extent of smearing on the undersurface will be noted. The slippery surfa allowed the left hand to "creep" backwards and interfered considerably with the accuracy of aim.

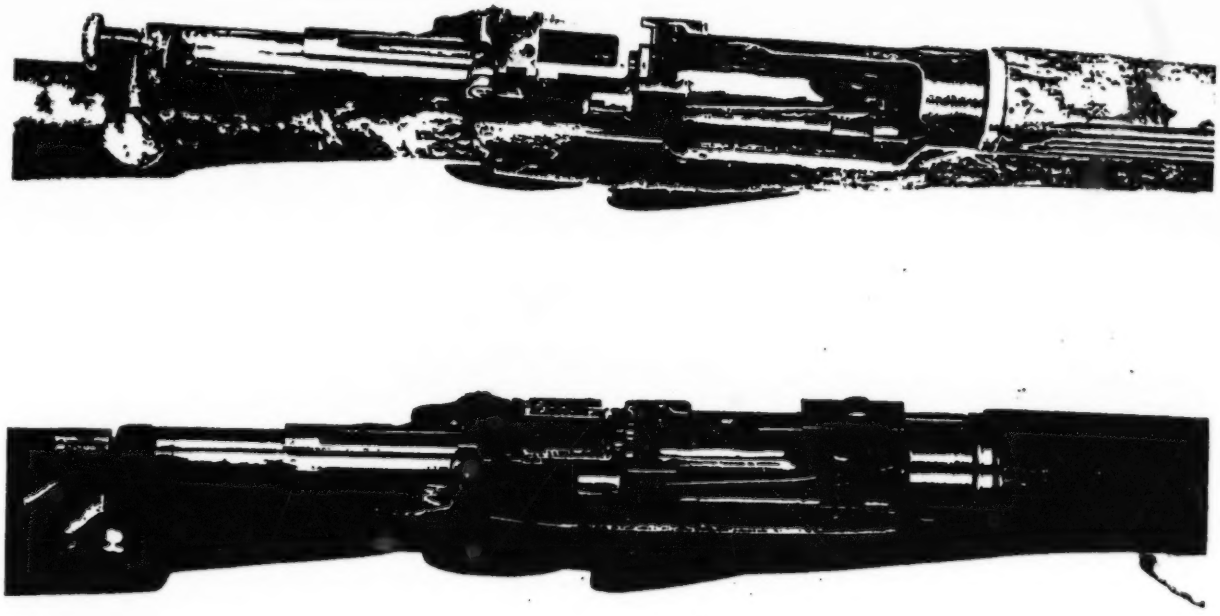

Fig. II. I-C-10-1043-5
Same Rifle as shown in Figure I. During the course of firing 30 rounds two stoppages were assumed to have occurred. The action of the bolt was interfered with to a considerable degree, due to contamination of the bolt and to an accumulation of ointment in the bolt channels which arose during loading operations The unsoiled mechanism is shown below for comparison.

Figure III. I-C-10-1043-2

Pistol, Cal. 38 S and W showing surface smearing with M5 ointment after 30 rounds had been fired. The same pistol after cleaning is shown below. After each shot, the hand tends to slip upwards on the grip towards the hammer, necessitating a change in position of the hand.

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